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VIABILITY OF DETACHED ROOT-CAP CELLS

L. KNUDSON

One can find in various texts the statement that the root-cap cells of plants die and are sloughed off, and it is probably the general opinion among botanists that the root-cap cells are either dead when they are sloughed off or that they die soon thereafter. Thus, in Jost's *Plant Physiology* (translation by Gibson, p. 283) the statements concerning the root-cap read as follows: "Its cells are short-lived, but they are constantly being renewed. In spite of this renewal the root-cap does not increase in size because the older cells die off in front and are cast off as new ones are formed."

That the root-cap cells, when sloughed off, are not necessarily dead or short-lived but may persist for many days, seems to be substantiated by various observations made by the writer with a number of different plants. In view of the increasing attention being devoted to the subject of root excretions, it seems desirable to make record of these incidental observations.

The observations here recorded were made primarily on the root-cap cells of corn, although similar observations were made with Canada field pea. The plants were grown in water cultures under sterile conditions, that is, with the roots growing in the entire absence of microorganisms. Pfeffer's nutrient solution was used, with the replacement of dibasic potassium phosphate for monobasic potassium phosphate and with or without one half percent sucrose.

The root-cap cells generally collected at the bottom of the culture vessel, appearing as slimy masses, the amount increasing with the age of the culture and the cells always being more abundant in the sucrose cultures. The cells were sometimes isolated, sometimes in chains of from two to seven cells, again in plates, and occasionally entire root-caps were noted. These cells were always in a healthful condition. They were well filled with protoplasm and each possessed a conspicuous nucleus centrally placed.

That the sloughed-off cells are not short-lived is borne out by the following: Various corn cultures, both with and without sugar, were examined. When the cultures were forty-five days old, the precipitates in the culture vessels were examined and in no case could a dead cell be found. Every cell was well supplied with protoplasm, and that the cells were living was apparent not only from their general appearance but also from the fact that the cells could be plasmolyzed by a glycerine solution and recovery followed.

Since in these experiments seedlings were transplanted to the culture vessels at the outset, and since some of the root-cap cells were sloughed off immediately, it seems fair to conclude that at the time they were examined some of the cells might have been forty-five days old.

In the case of Canada field pea cultures similar results were noted, and even more striking results were obtained as a result of an experiment. In two sucrose cultures (one half percent sucrose) with Canada field pea, all detached root-cap cells were found alive at the end of fifty days. To test further the viability of the cells, the plants were removed from two of the sucrose culture solutions and the solutions were left exposed to the air. Various moulds and yeasts developed in the culture solutions, but despite the contaminations the detached root-cap cells were still alive at the end of twenty-one days more.

Some of these root-cap cells must have been sloughed off during the first days of the experiment, and therefore must have maintained themselves alive, after becoming detached, for a period of seventy-one days. It was necessary to conclude the experiment in order to examine all the cells, so that the maximum period of viability could not be determined.

LABORATORY OF PLANT PHYSIOLOGY,
CORNELL UNIVERSITY